**Implementation of Data Discretization (any one) & Visualization (any one)**

import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

np.random.seed(42)

age = np.random.randint(18, 80, 200)

income = np.random.normal(50000, 20000, 200)

income = np.abs(income)

user\_data = pd.DataFrame({

'Age': age,

'Income': income

})

print("User Data Sample:")

print(user\_data.head(8))

print(f"\nIncome Statistics:")

print(f"Minimum: ${user\_data['Income'].min():.2f}")

print(f"Maximum: ${user\_data['Income'].max():.2f}")

print(f"Average: ${user\_data['Income'].mean():.2f}")

user\_data['Income\_Category'] = pd.cut(user\_data['Income'],

bins=4,

labels=['Low', 'Medium', 'High', 'Very High'])

print("\nData after Discretization:")

print(user\_data.head(10))

category\_counts = user\_data['Income\_Category'].value\_counts().sort\_index()

print(f"\nIncome Category Distribution:")

print(category\_counts)

plt.figure(figsize=(12, 5))

plt.subplot(1, 2, 1)

plt.hist(user\_data['Income'], bins=20, color='lightblue', edgecolor='black', alpha=0.7)

plt.title('Original Income Distribution')

plt.xlabel('Income ($)')

plt.ylabel('Frequency')

plt.grid(True, alpha=0.3)

plt.subplot(1, 2, 2)

colors = ['lightcoral', 'lightyellow', 'lightgreen', 'lightskyblue']

category\_counts.plot(kind='bar', color=colors, edgecolor='black')

plt.title('Discretized Income Categories')

plt.xlabel('Income Categories')

plt.ylabel('Number of People')

plt.xticks(rotation=0)

plt.grid(True, alpha=0.3)

plt.tight\_layout()

plt.show()

print("\nCategory Ranges:")

for category in ['Low', 'Medium', 'High', 'Very High']:

category\_data = user\_data[user\_data['Income\_Category'] == category]['Income']

if len(category\_data) > 0:

print(f"{category}: ${category\_data.min():.0f} - ${category\_data.max():.0f} ({len(category\_data)} people)")